CODAC CORE SYSTEM VERSION 5.1 RELEASE NOTES

ITER_D_RGMK6D

This note is a supplementary document for the CODAC Core System (CCS) to provide users with information on the changes introduced with the release of the CCS 5.1.0 version.

This document is complemented with on-line documentation that is available at the **CODAC Core System Community Pages** that will provide the CCS users with the up-to-date status of:

- The complete documentation (updated for CCS 5.1.0)
- The changes introduced in each components (improvements and bug fixes)
- The known issues remaining in the 5.1.0 version
- The training
- The roadmap
- Frequently Asked Questions (FAQ)

The updated documentation is also included in the CCS distribution, as usual.

CCS 5.1.0 is a minor release. As a result, the changes should have limited impact on the software developed with CCS 5.0.

COMPONENTS UPDATE

	Components	4.3.0	5.0.0	*5.1.0*
1 - Operating System	RHEL	6.3	6.5	
	MRG-R	2.2	2.5	
2 - EPICS	EPICS	3.14.12	3.15.1	3.15.2
	MCoreUtils	-	1.2	1.2
3 - EPICS v4	EPICS V4	-	4.4.0	4.4.0
4 - Control System Studio	CS-Studio	3.3	4.0	4.2
5 - Self Description Data	SDD tools	4.3	5.0	5.1
6 - Maven Tools	Maven tools	4.3	5.0	5.1
7 - Health Monitoring	Health Mon	1.1	1.2	1.3
8 - PLC Driver	S7PLC	2.1	2.1	2.1
	S7PLC ASYN	1.0	1.0	1.1
9 - TCN Support	TCN API	3.0	3.1	3.1.1
	TCNd	3.0	4.0	4.1
	LinuxPTP	-	1.3	1.3
10 - SDN Support	SDN support	1.2	2.0	2.1
11 - DAN Support	DAN API	1.1 (β)	2.0	2.1
12 - Logging Library	LOG API		1.0	1.1
13 - NI Sync	NI SYNC	2.0.2	2.1.0	2.1.1
	NYSYNC EPICS	2.0.2	2.0.3	2.0.4
14 – PXI-6259	PXI-6259	2.2.0	2.3.1	2.4.1
	PXI-6259 EPICS	2.2.0	2.3.1	2.4.0
15 - PXI-6528	PXI-6528	1.2.0	1.3.0	1.3.0
	PXI-6528 EPICS	1.0.0	1.3.0	1.3.1
16 - PXIe-6368	PXIe-6368	1.0.1	1.1.0	2.0.1
	PXIe-6368 EPICS	1.0.1	1.1.0	1.2.0
17 - NI RIO	NI RIO	1.0.1	1.0.2	1.0.3
	NI RIO EPICS		-	1.0.0
18 - NDS	NDS	2.3.5	2.3.7	2.3.8

1 Operating System (same as CCS 5.0)

The RHEL version is RHEL 6.5. For non real-time profiles, the kernel version is 2.6.32, as for the CCS 4.x versions, but updated to 2.6.32-431.

The MRG-R version is MRG-R 2.5. The kernel version is kernel-rt-3.10.33.

One change in CCS 5.1 is the update of glibc to version 2.12-1.149 as recommended by Red-Hat for security reasons.

2 EPICS

The EPICS base 3.15 has updated to 3.15.2. This is only a patch release

Reference: http://www.aps.anl.gov/epics/base/R3-15/2.php

One change to take note of is that the limit on link field length in database files has been increased from 79 bytes to 255 bytes (Bug 7001).

EPICS modules have been also updated:

asyn	4.26
Autosave	5.6.1

SNL sequencer	2.2.2
STD module	3.4

3 EPICS v4

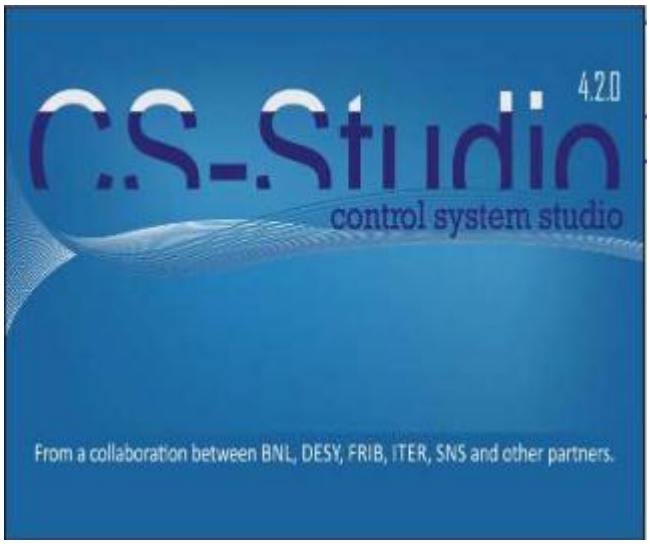
No changes in this release.

4 Control System Studio (Cs-Studio)

Many enhancements and few corrections have been introduced in this version (details available from the community pages).

The main new enhancements in CS-STUDIO are the following:

4.1 Integration of CS-STUDIO 4.2.0 release



4.2 Database save/restore command

New mini-CODAC save/restore database command to allow taking a snapshot of any databases – archive, alarm, message history or logbook and with the possibility to specify a time frame for the snapshot.

```
$ css-dbmanager [-file file_name] [-rdb_name db_name] [-save] [-restore] [-from start_time] [-to end_time]
```

```
$ css-dbmanager -help

Usage:

      css-dbmanager -list | -save | -restore -file <my backup file> -rdb_name dbname [-from t1] [-to t2] [-rdb_user user] [-rdb_host host] [-rdb_url url]

Options:
      -help                          show Help
      -version                       show version
      -list                          list available databases, then exit
      -save                          save database (to be used with the option -file)
      -restore                       clean and restore database (to be used with the option -file)
```

-file my_backup_file	dump file name (.zip extension is added automatically)
-rdb_name name	database name to save or restore (such as css_archive_3_0_0)
-from "yyyy-mm-dd hh24:mi:ss"	time of the first entry (time must be between quotes)
-to "yyyy-mm-dd hh24:mi:ss"	time of the last entry (time must be between quotes)
-rdb_user user	database username (such as archive)
-rdb_host host	database server host (by default localhost)
-rdb_url url	database url (by default jdbc:postgresql)
-verbose	verbose mode
-format	PG dump/restore format (by default plain)

The keyword 'all' can be used after -save or - restore to target all databases instead of specifying -rdb_name.

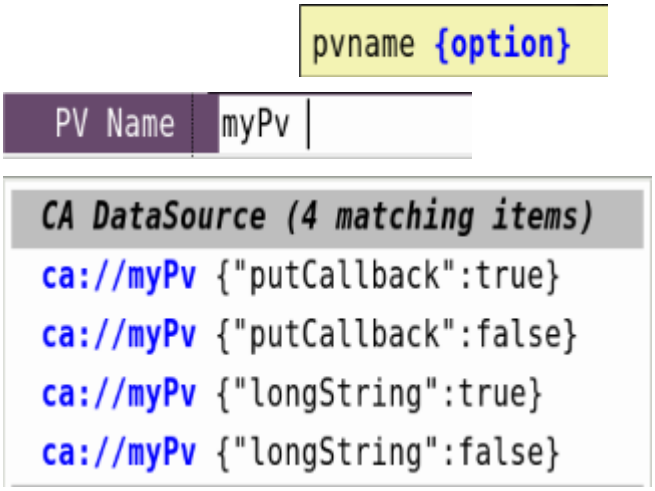
In that case, the backup file name will be automatically generated.

Example:

```
css-dbmanager -save all -from "2015-01-01 00:00:00" -to "2015-06-01 17:00:00"
```

4.3 Auto-Complete improvements

Implemented Auto-Complete support for ca JSON extension



4.4 OPI Validation

A new OPI Validation tool built on the Eclipse's validation framework provides means to validate and fix existing OPI files with respect to the ITER OPI schema. The validation can be invoked manually on one OPI file or on a group of these by means of the Validate context menu item.

The validation results are displayed in a dialog window. Problems, if any, are listed in a dedicated view (see Figure 4-1). This view allows, by double-clicking on a message, to highlight the failing widget in the OPI editor. From the same view, fixes can be applied by invoking the Quick fix context menu item on a message. Fixes shall be acknowledged by the user before saving.

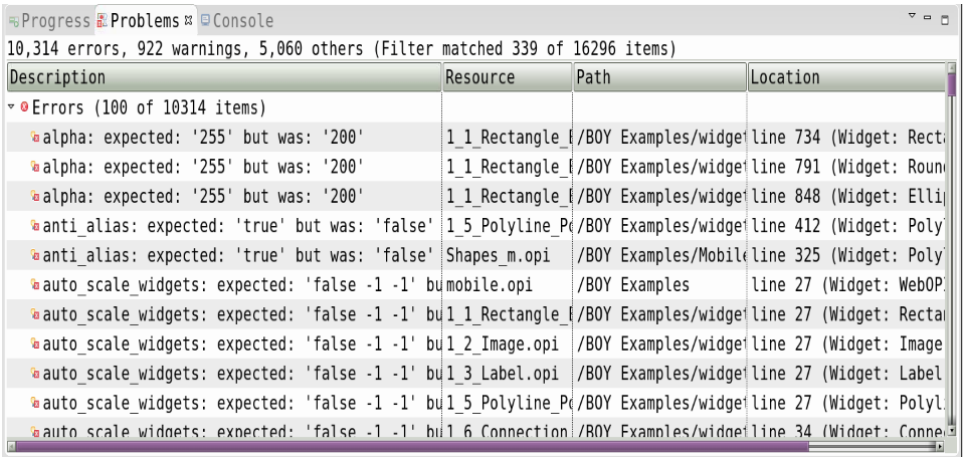
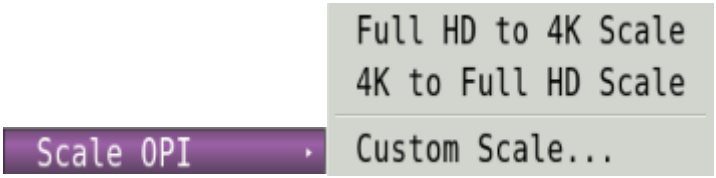


Figure 4-1 - Problems view displaying validation errors

4.5 OPI Scaling

Commands have been added for re-scaling OPIs between Full HD and 4K (Quad HD). A factor of 2 is applied for these re-scaling. Other scaling factor can be used (Custom Scale)



4.6 Other OPI improvements

- A shortcut has been added for using the CODAC provided templates that implement the standard panes in OPIs: navigation pane, control pane for the faceplates, UTC and logo pane, etc.
- New Full HD color, font and schema definition compliant with ITER HMI Design Guide.

  Note: the use of mono-space font may impact the layout of existing OPI files. Manual adjustments could be required to align text widgets with other widgets.

- Updated color definition file – invalid/disconnected PVs shown in magenta, pipes with flow in very dark-grey and pipes without flow in mid-grey
- User input validation using JavaScript is demonstrated with the faceplate template AnalogComponent.opi (see Figure 4-2)

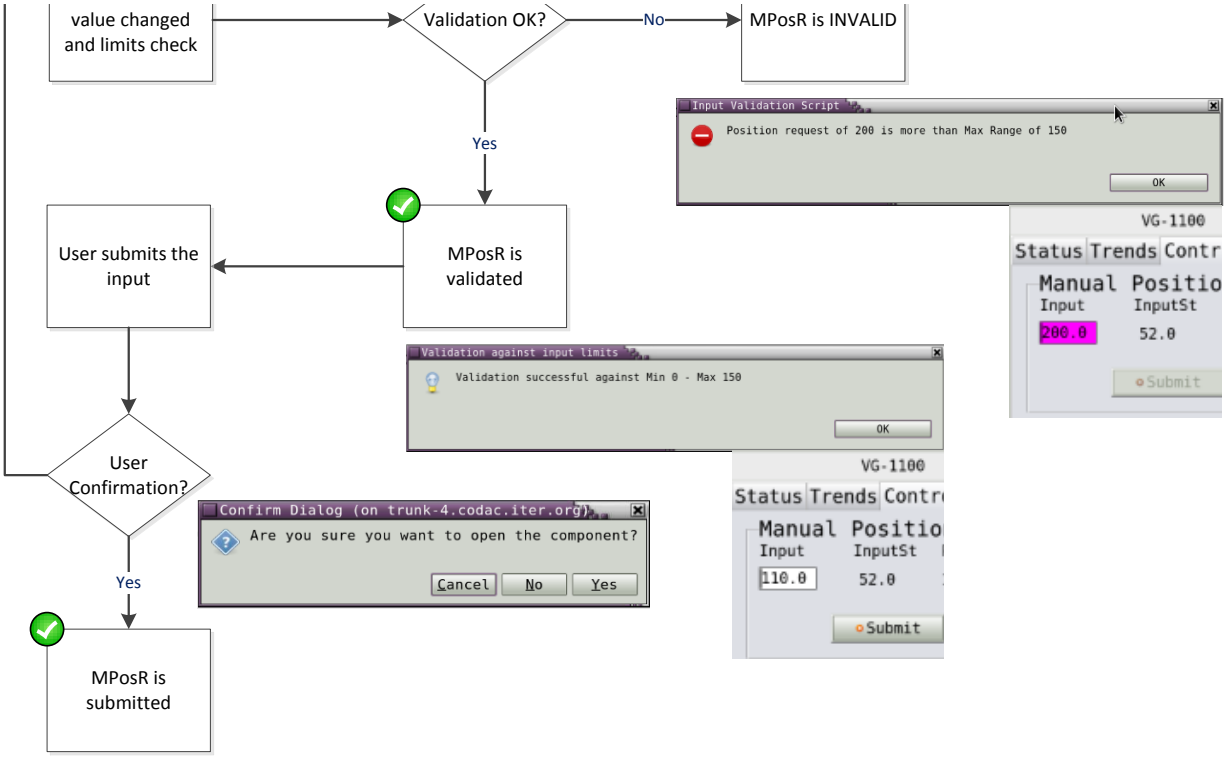


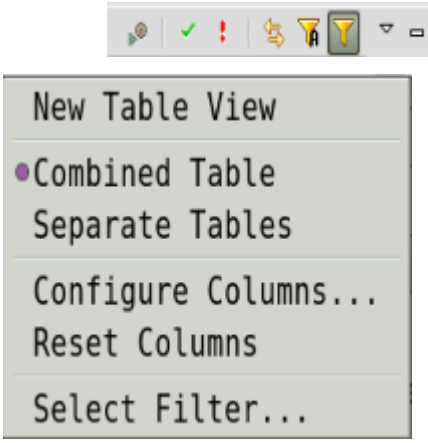
Figure 4-2 - User Input Validation

For performance reasons and for a better integration in the Java platform, we now strongly recommend using JavaScript instead of Python in OPIs.

4.7 Alarm Tables

Many alarm table views can now be opened at the same time

New View menu:



The layout of the alarm table view has been extended with:

- Alarm acknowledgement tick box
- Alarm priority icons (see Figure 4-3)

	Icons	Shelved alarms*
Invalid/Unknown alarm		
" recovered		
" acknowledged		
Major alarm		
" recovered		
" acknowledged		
Minor alarm		
" recovered		
" acknowledged		

** Shelved – the operator has prevented a nuisance alarm from being displayed for a limited time*

Figure 4-3 - Alarm priority icons

The alarm priority symbols are flashing at 2Hz until acknowledged by the operator.

Alarm table have been also extended with Alarm Action as the first guidance description and Alarm ID as the first guidance title (see Figure 4-4)

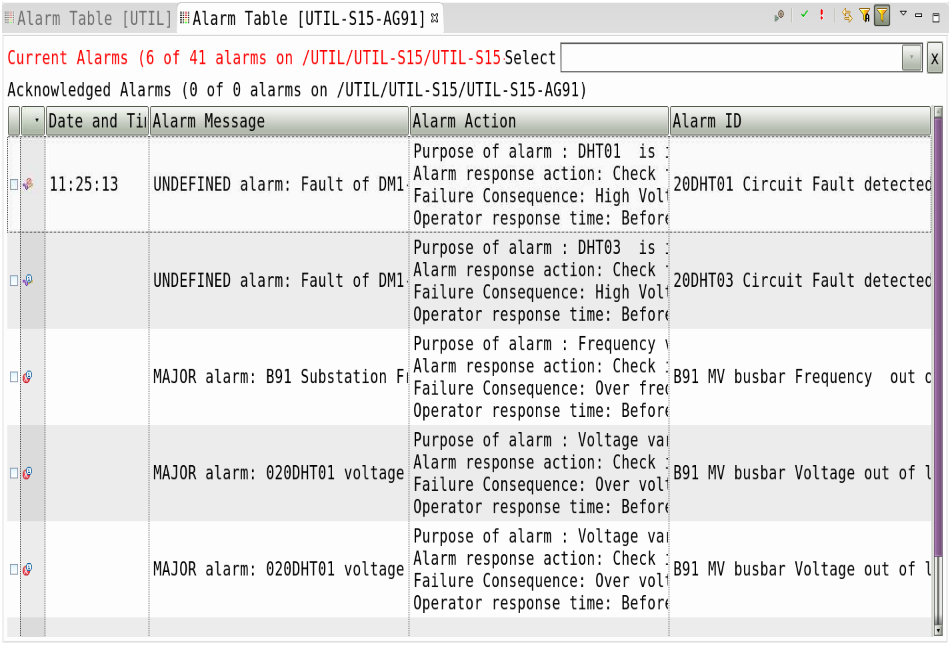


Figure 4-4 - Alarm table with Actions and ID

5 Self Description Data

Many enhancements and corrections have been introduced in this version (details available from the community pages).

The main additions in the SDD Tools for CCS 5.1 are the following:

- Support for POC

- Support for PLC Events
- Support for EPICS Record Info
- New BOY OPI screens with Navigation Panel
- Enhanced Cubicle Monitoring mechanism for allowing one PLC to monitor many Cubicles
- Improved Excel exchange including attribute domain filtering for Variable Import.

Note: Existing projects shall be imported into a version 5.1.0 development system and the configuration files re-generated before compiling.

5.1 Support for POC in SDD

A **Plant Other Controller** (**POC**) is a plant system I&C controller that doesn't comply with the IO specifications for fast controllers neither with the ones for slow controllers. But it may have interfaces with the CODAC networks (PON, TCN, DAN and SDN). There can be two types of POCs, "POC with CA" and "POC without CA", depending on whether or not the controller includes a Channel Access (CA) server and implements the CODAC interface via EPICS PVs. If it is not the case, the controller shall be interfaced from another host via a dedicated EPICS device support.

POC can be added as Control Unit to a Plant System I&C. Dedicated editors have been added for POC, either with or without CA (see Figure 5-1).

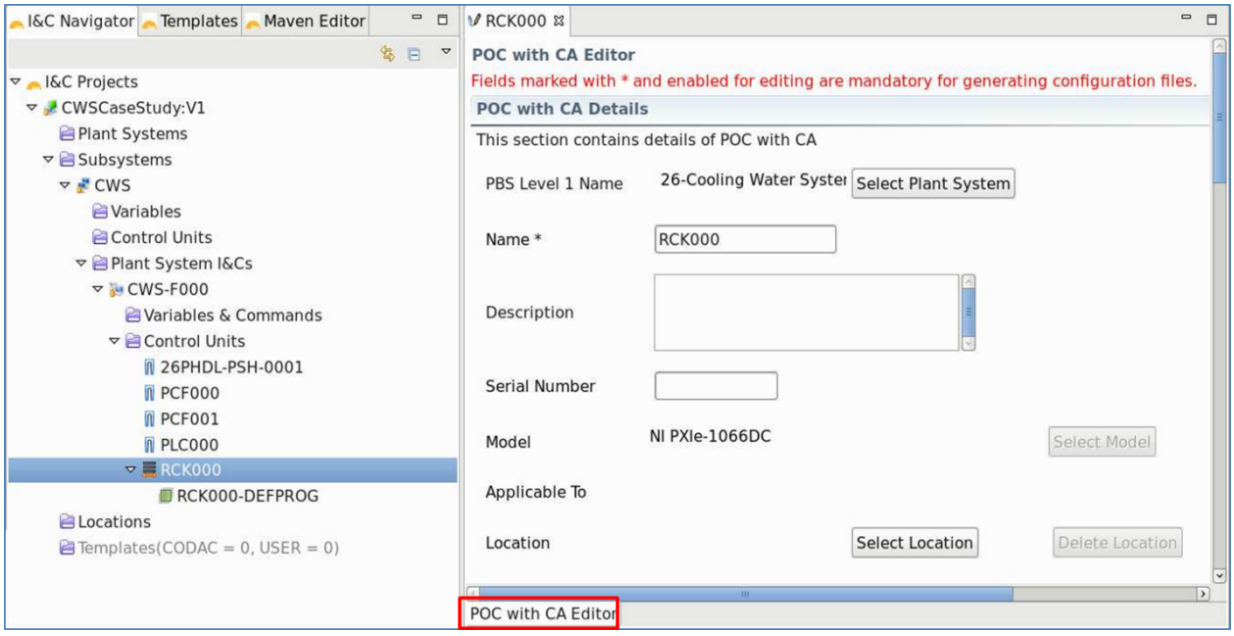


Figure 5-1 - POC with CA editor

5.2 Support for PLC Events

When editing PLC variables, it is now possible to add PLC Events (see section 8.1 below) in addition to variables and commands. A dedicated editor for PLC events has also been added (see Figure 5-2)

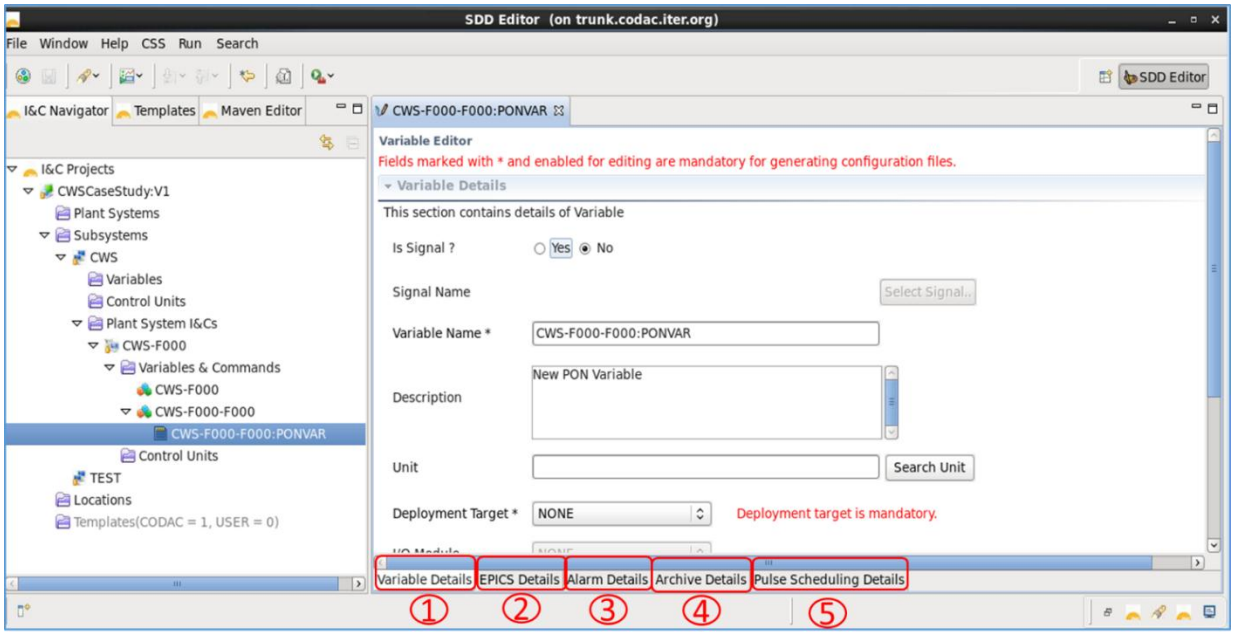


Figure 5-2 - PLC Event Editor

5.3 Support for EPICS Record Info:

"Info" field in records is a standard EPICS feature that some device support modules use. It is the case now for the NI SYNC and PXIe-6368 device support.

The edition of the "info" part of the records has been added into the "Predefined Attributes" by means of an additional "EPICS Info" tab (see Figure 5-3).

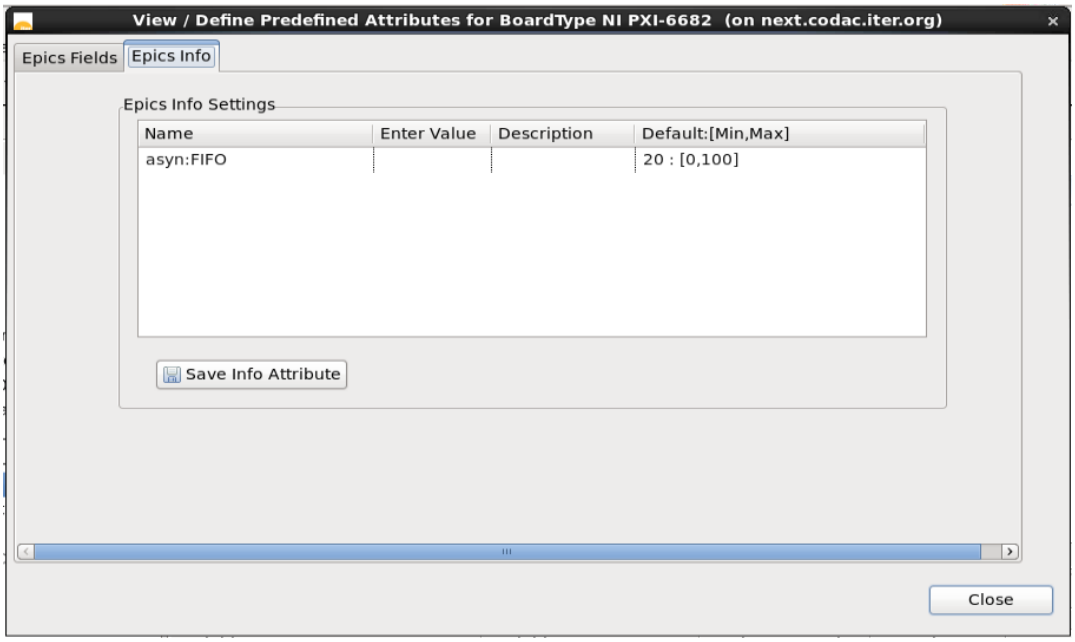


Figure 5-3 - Info tab in Predefined attributes view

5.4 Generating new BOY OPI screens with Navigation Panel

SDD Translator now generates three sets of BOY OPI files. Each set contains I&C Project specific screens.

- **Full HD**: Files for this format are generated under the folder location: `<project_name>/src/main/boy/sdd/full_hd`. These OPIs are for Full HD screens. The entry point for navigating into these OPIs is "**`<CBS1>-SDDMain.opi`**".
  - **Quad HD**: Files for this format are generated under the folder location: `<project_name>/src/main/boy/sdd/quad_hd`. These OPIs are for 4K screens in Quad HD mode. The entry point for navigating into these OPIs is "**`ITER-SDDMain.opi`**".

    Quad HD files also include a set of files that are generated for adding an external frame to the OPIs:

    - Navigation Panel at bottom
    - Alarm Panel on right side
    - Legend Panel on right-bottom corner
  - **Empty User Files:** Additional files are generated under the folder location: `<project_name>/src/main/boy`. These are empty canvas that user shall edit for adding his/her own OPI. The entry point for navigating into these OPIs is "**`ITER.opi`**".

5.5 One PLC to monitor multiple Cubicles:

It is now possible to configure one PLC monitoring many cubicles and to generate the PLC files accordingly.

6 Maven Tools

The following functions have been added to Maven tools and used from other Eclipse tools (CS-Studio and SDD):

- OPI scaling commands for Full HD / Quad HD scaling
- OPI validation commands
- Install/Uninstall command for installing or removing RPMs on selected host.
- SVN tag and branch creation
- Options for restarting the Alarm Notifier and Alarm Annunciator

7 Health Monitoring

The following information has been added:

- Network traffic
- PLC Event communication status
- Connection status with the PLC implementing cubicle(s) monitoring

For supporting "Plant Other Controllers" (POCs), a template has been added to define the health monitoring interface that these controllers shall implement.

With correction in PLC code, the fan status now indicates the command that is applied to the fan (not yet its actual status).

8 PLC Driver

In CCS 5.1, the S7PLC Asyn driver has been upgraded to v1.1 and SPSS to v3.0. These 2 new versions shall be used together for new features (PLC event).

8.1 PLC event

From s7PLCAsyn v1.1, the driver supports an additional communication channel from PLC to PSH (see Figure 8-1). This new "Event" channel can be used to transmit time-stamped BOOL events to the IOC with minimum delay. This channel is not supported on redundant PLCs.

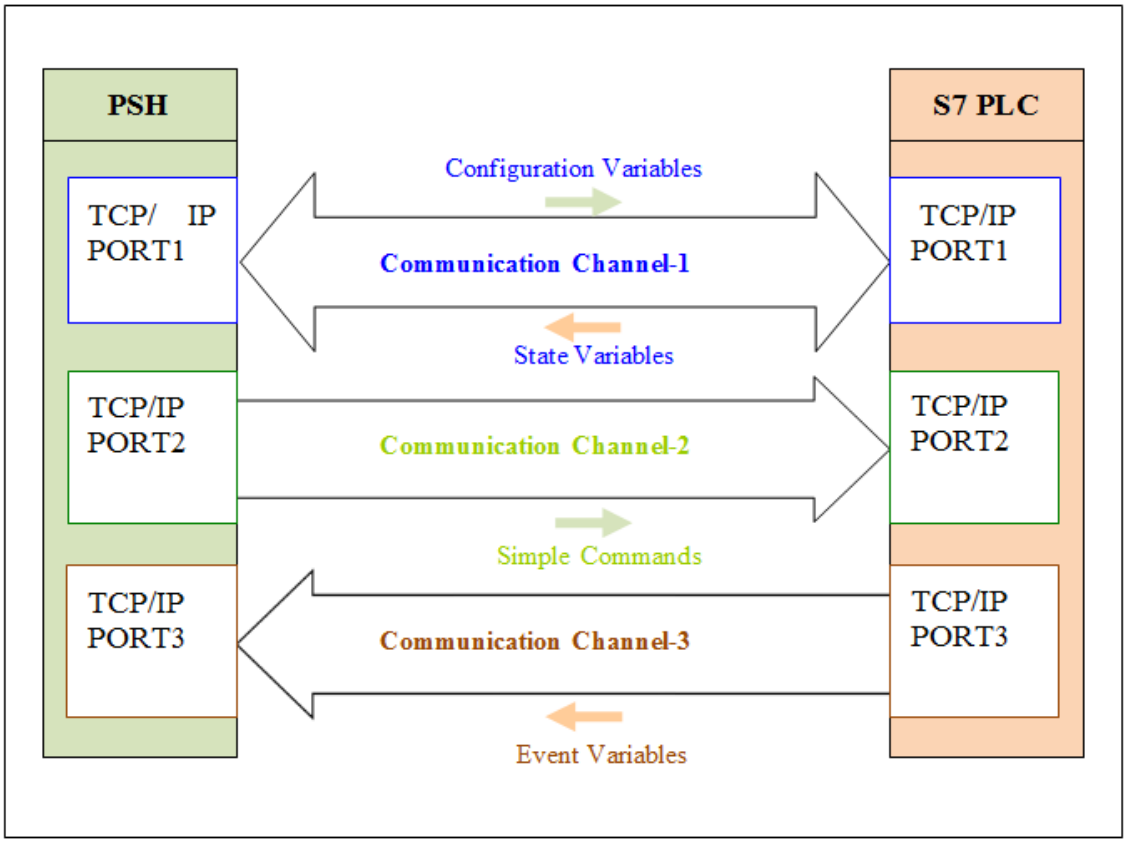


Figure 8-1 - EPICS IOC and s7PLCAsyn Communication

8.2 Control of the configuration transmission (CFGWRCNTR)

A significant change has been introduced with s7PLCAsyn v1.1 for controlling the transmission of the configuration variable from the IOC to the PLC.

The transmission is controlled by a Boolean variable, **CFGWRCNTR**. One such PV is added for each PLC. The full name is: [CBS1]-[CBS2]-SYSM:P[PLC-NB]-CFGWRCNTR.

Only when this variable is set, the configuration variables are sent to the PLC. The variable is persistent, therefore, once set, provided the configuration values are saved and restored, the transmission will be enabled. But it must be set once (default value is 0).

As a result, for each new installation or in case the EPICS database has been cleared (ex: restart without autosave), no data is transmitted until this variable is set.

This prevents erased or not initialized configuration values to be sent until all configuration variables, including CFGWRTCNTR, has been initialized or restored.

9 TCN Support

Code improvements have been introduced after code review for robustness. In particular, some weaknesses in multi-threading or concurrent usage have been suppressed.

10 SDN Support

An EPICS interface has been added to the SDN monitoring node.

Some code improvements have been introduced for robustness.

The verifications have been done with both Chelsio's T320-CR and T420-CR.

11 DAN Support

A new version is provided with some bug fixes and extensions.

The documentation has been improved.

The data access library is now included in the distribution.

12 Logging Library

2 enhancements:

- Forward mode configurable through an environment variable
- More identifiers in IOC log messages: hostname, IOC name, PID.

13 NI Sync

A new version of the PXI-6683H firmware is included (14121920). Its installation is strongly recommended.

It resolves the "runt pulse bug":

Bug 5833 - timestamp edges are reported incorrectly after runt pulse)

Reminder: Firmware upgrades are not made transparently by the driver in CCS. User shall explicitly install a new firmware (details in the user documentation).

Few corrections have been made in the EPICS device support (details on community pages).

14 PXI-6259

Few improvements and changes in the EPICS device support:

- Bug 6868 - Segmentation fault in EPICS PXI-6259 init_daq() function
- Add clock source as PV
- Do not initialize the scan rate of the samples read (-SR) PV (was I/O interrupt)

15 PXI-6528

Minor bug fix only in EPICS device support (log messages when no board).

16 PXIe-6368

Counter function support has been added in the Linux driver.

The EPICS device support has been extended with PVs controlling:

- AO data generation methods
- AO sampling rate
- Sample clock
- AO start
- External/internal trigger source

17 NI RIO

One issue has been resolved in the NI RIO library:

> Bug 6234 - System hangs when downloading FPGA to MXIe-RIO NI 915x devices with the "No FPGA" DIP switch turned on

NI-RIO EPICS interface (v1.0) has been added in CCS 5.1. This is a new component implemented with Asyn and a 3rd party library named **IRIO**, which is also included in the distribution. Full documentation is also available now in the distribution.

18 NDS

The latest version (2.3.8) is included in the distribution.

DOCUMENTATION UPDATE

Document	ID	4.3.0	5.0.0	5.1.0
OVERVIEW				
CODAC Core System Overview	34SDZ5	v4.3	v5.0	v5.1
CODAC Core System User Manual	43PSH9	v3.3	v3.4	v3.5
INSTALLATION & SUPPORT				
CODAC Core System Installation Manual	33JNKW	v4.9	v5.1	v5.1
CODAC Core System Migration Manual	7JCFUD	v3.8	v4.0	v5.0
DEVELOPMENT & TESTING				
CODAC Core System App Developer's Manual	33T8LW	v4.6	v5.0	v5.1
SDD Editor User Manual	32Z4W2	v7.4	v8.0	v8.1
SDD Web Application User's Guide	42NFCY	v7.0	v8.0	v8.1
SDD Synchronization Guide	46AAXR	v1.12	v1.13	v1.14
How to include a new I/O module in SDD	A4WQDZ	v2.0	v2.0	v2.0
Maven Editor User Guide	7MT2YC	v4.2	v5.1	v5.2
System Health Monitoring Variables	35XFCY	-	v1.12	v1.14
Logging library - Software User Manual	QEK784		v1.1	v1.1
CONTROL SYSTEM STUDIO				
Operator Interface standardisation - CSS BOY Edition and Runtime	7367JQ	v1.4	v1.6	v1.7
CSS all in one (training slides)	BFGP5Q	v1.6	v1.7	v1.8
Operator Interface standardisation - CSS BOY Industrial Symbol Library	A69URK	v1.3	v1.4	v1.4
SLOW CONTROLLERS (PLC)				
SPSS User Manual	G4UMX5	v1.3	v1.4	v2.0
S7 PLC EPICS Driver Extensions	6KFJEJ	v2.0	v2.0	v2.0
PLC Sample Guide	2N8C3M	v3.1	v4.0	v4.1
s7PLCAsyn EPICS Driver User's Manual	PJAHXJ		v1.0	v1.2
FAST CONTROLLERS - I/O				
NI Sync Linux Device Driver User's Guide	2PLQ4P	v2.4	v2.6	v2.6
NI Sync EPICS Driver User's Guide	33Q5TX	v2.7	v2.10	v2.11
NI PXI-6259 Linux Driver User's Guide	32GTJY	v1.17	v1.18	v1.18
NI PXI-6259 EPICS Driver User's Guide	3DEY52	v2.6	v2.8	v2.9
NI PXI-6528 Linux Driver User's Guide	3ZHXQ9	v1.7	v1.8	v1.8
NI PXI-6528 EPICS Driver User's Guide	433VEW	v1.10	v1.11	v1.11
NI X-Series Linux Device Driver User's Guide	3LTMR6	v1.3	v1.5	v1.5
NI X-Series EPICS Driver User's Guide	3P4N3R	v1.3	v1.4	v1.5
NI-RIO Linux Device Driver User Manual	LW3UFH	v1.5	v2.4	v2.6
NI-RIO EPICS Device Driver User Manual (new)	RAJ9P8	-	-	v1.0
IRIO Library user's manual (new)	RATM8Z	-	-	v1.0
NDS User Manual	A6LWQ8	v1.2	v1.2	v1.2
FAST CONTROLERS – HPN				
TCN API - Software User Manual	N4XTGG	v1.2	v1.6	v1.7
Linuxptp User Manual	PNRCMB		v1.2	v1.3
TCNd User Manual	MUYNT6	v1.2	v1.6	v1.7
SDN Software User Manual	B7SKFU	v1.17	v2.0	v2.2
DAN User manual	Q6GULS	-	v1.3	v2.1